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Virulence and antibiotic resistance of isolates of Klebsiella pneumoniae in newborns with localized and generalized forms of infection

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© The authors team, 2018.All Rights Reserved. Objective. To study the effect of virulence and antibiotic sensitivity of K. pneumoniae on the course and outcome of localized and generalized forms of infection in newborns. The authors studied 25 samples of K. pneumoniae isolated from the blood (12 isolates) and feces (13 isolates) of the children with various forms of neonatal infection. Group 1 consisted of 12 children with bacteriologically proven neonatal sepsis, K. pneumoniae was isolated of their blood. Group 2 included 13 children with localized bacterial infection in the form of pneumonia, K. pneumoniae was isolated from their feces. The PCR method was used to determine the virulence factors of the isolates of K. pneumoniae-rmpA, aerobactin and colibactin. The sensitivity of K. pneumoniae to antibiotics was determined by the Kirby-Bauer method. The double disk method was used to determine the ability of K. pneumoniae to produce extended-spectrum β-lactamases (ESBL). Results. In Group 1 the isolates of K. pneumoniae produced ESBL in 8 children out of 12. The bacteria were sensitive to meropenem, amikacin and ciprofloxacin in 4 cases. One child demonstrated resistance to meropenem. The remaining 4 isolates were sensitive to the third-generation cephalosporins protected by aminopenicillins, amikacin, meropenem and ciprofloxacin. The rmpA gene was determined in the K. pneumoniae isolates in 6 children. The “string-test” of these colonies of K. pneumoniae in all cases gave a positive result. The genes of siderophores, aerobactin and colibactin were found in 3 isolates. Aerobactin and colibactin produced only rmpA-bearing strains. 3 isolates (23%) of K. pneumoniae produced ESBL in Group 2. In 8 out of 13 cases there was rmpA-gene and genes of aerobactin and colibactin in 11 and 7 cases accordingly. The “string-test” was positive in 8 cases, and there were only rmpA-positive bacteria. Siderophores were detected both in rmpA-positive and rmpA-negative isolates. The microbes produced BLBR and were rmpA-posi-tive in 2 children. In one case, the isolates had neither the characteristic virulence factors, nor BLBR. Conclusion. The risk of developing localized and generalized forms of neonatal klebsiella infection is largely determined by microbiological features of the microorganism, its resistance and virulence. We observed clinical variants of the disease caused by K. pneumoniae which simultaneously had two properties: high aggressiveness and resistance to antibiotic therapy.

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Keywords

Antibiotic resistance, Children, Klebsiella pneumoniae, Neonatal sepsis, Virulence

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